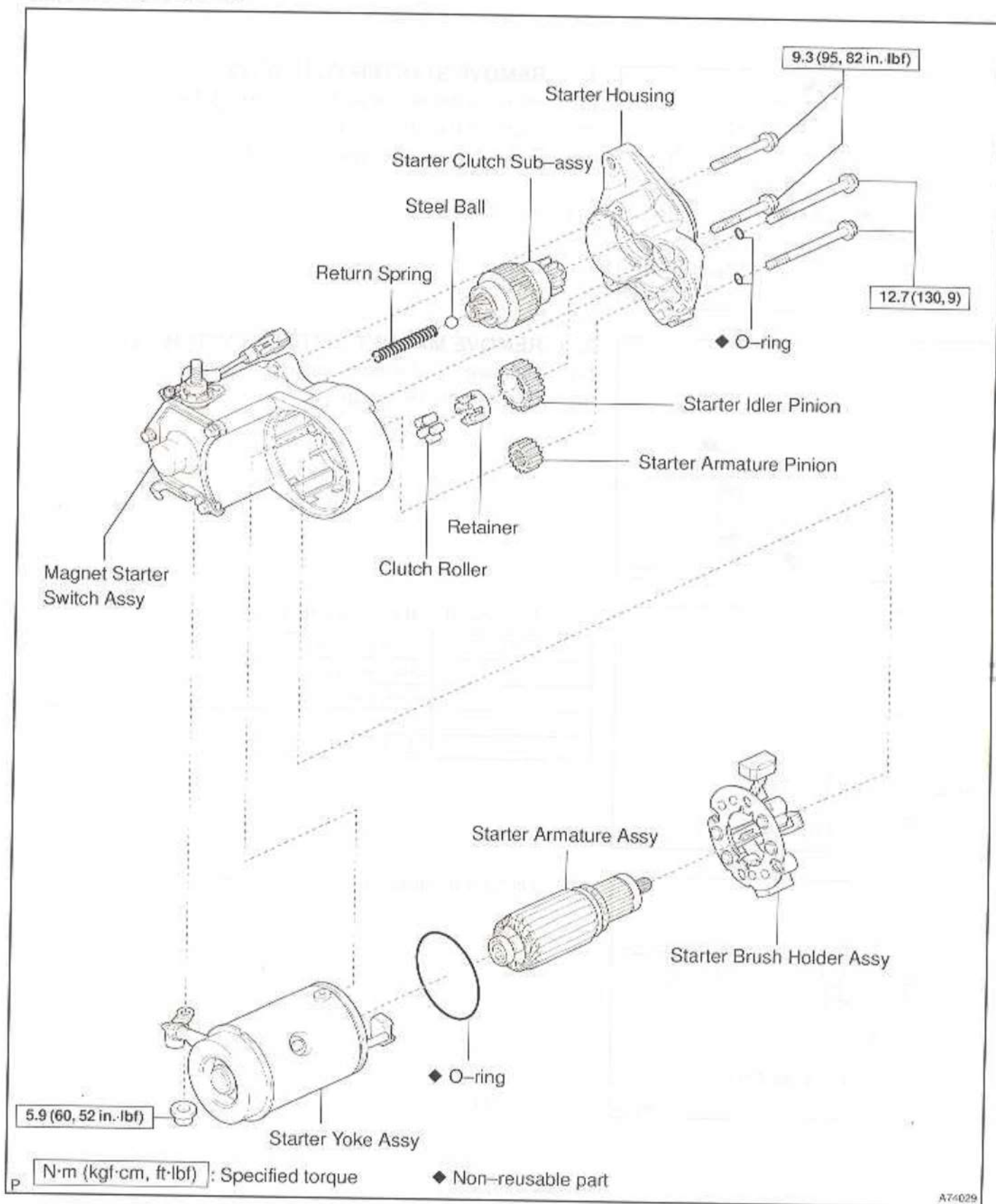


STARTING & CHARGING - STARTER ASSY (5L-E)

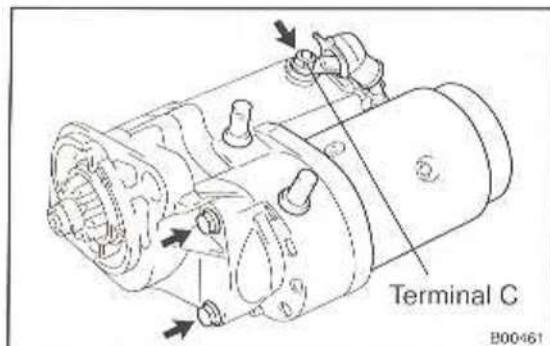
STARTER ASSY (5L-E)

COMPONENTS

1223.8-91

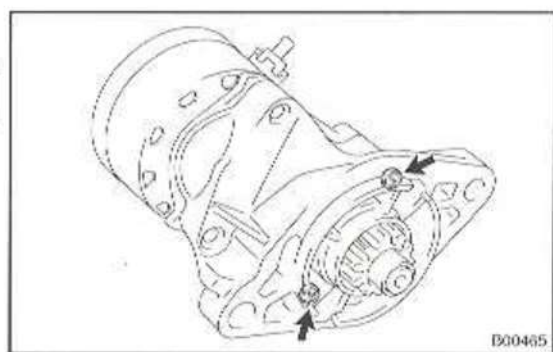


OVERHAUL



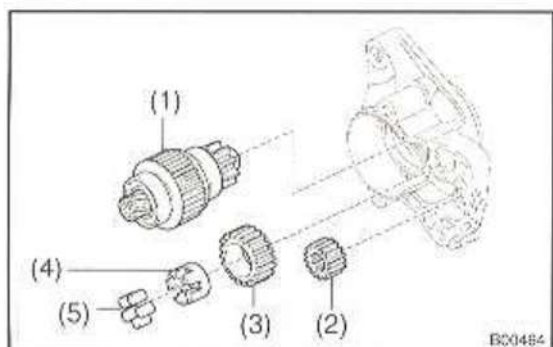
1. REMOVE STARTER YOKE ASSY

- Remove the screw and terminal 50 wire.
- Remove the nut and disconnect the terminal C wire.
- Pull out the starter yoke assy with the armature assy.



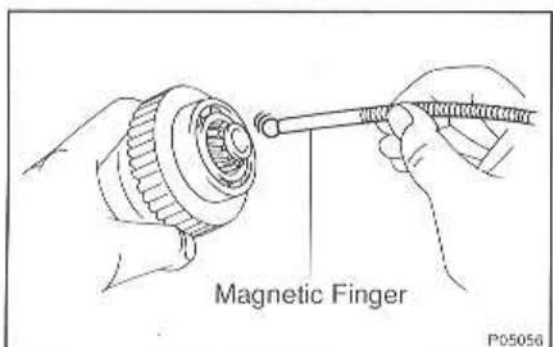
2. REMOVE MAGNET STARTER SWITCH ASSY

- Remove the 2 screws and magnet starter switch assy.
- Remove the return spring.



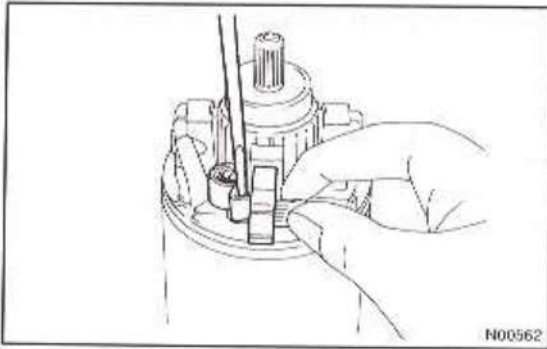
(c) Remove these parts from starter housing.

(1)	Starter clutch sub-assy
(2)	Starter armature pinion
(3)	Starter idler pinion
(4)	Retainer
(5)	Clutch roller

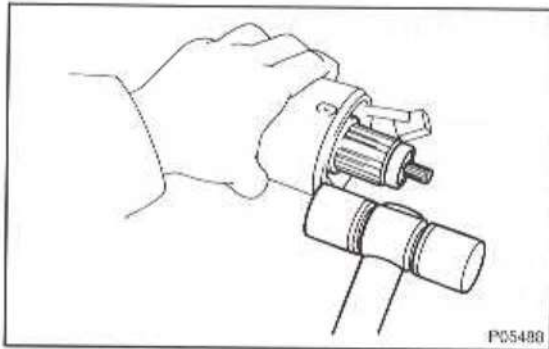


(d) Using a magnetic finger, remove the steel ball.

STARTING & CHARGING - STARTER ASSY (5L-E)

**3. REMOVE STARTER BRUSH HOLDER ASSY**

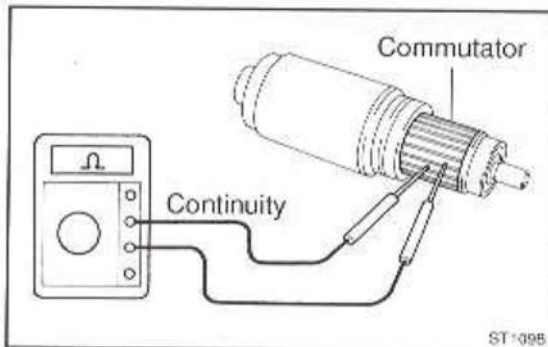
- (a) Using a screwdriver, hold the spring back and disconnect the brush.
- (b) Disconnect the 4 brushes and remove the brush holder assy.

**4. REMOVE STARTER ARMATURE ASSY**

- (a) Using a plastic-faced hammer, tap the end of starter yoke assy and remove the armature assy.

5. INSPECT STARTER ARMATURE ASSY

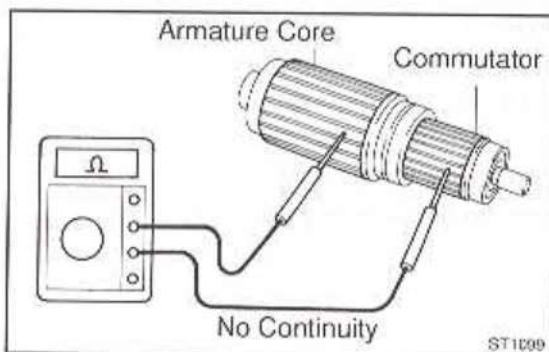
If the surface of the commutator is dirty or burned, polish the part with sandpaper (#400) or replace the armature.



- (a) Check the commutator open circuit.

- (1) Using an ohmmeter, check that there is continuity between the segments of the commutator.

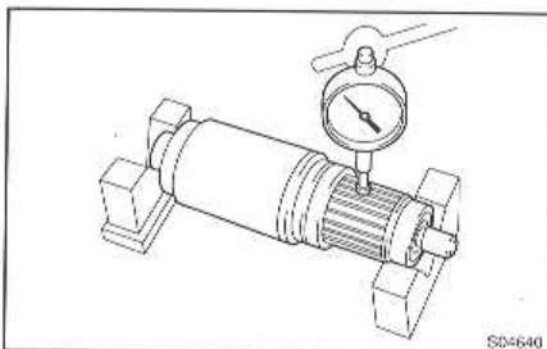
If there is no continuity between any segment, replace the armature assy.



- (b) Check the commutator ground.

- (1) Using an ohmmeter, check that there is no continuity between the commutator and armature core.

If there is continuity, replace the armature assy.



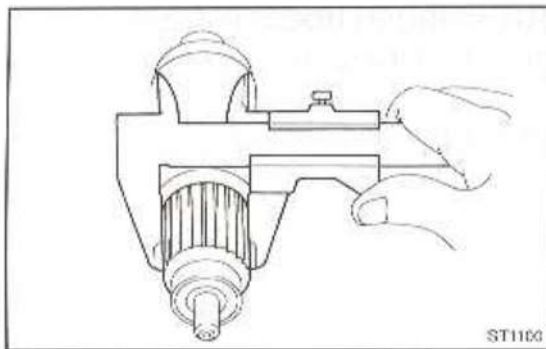
- (c) Check the commutator circle runout.

- (1) Place the armature on the V-blocks.

- (2) Using a dial gauge, measure the circle runout.

Maximum circle runout: 0.05 mm (0.0020 in.)

If the circle runout is greater than maximum, correct it with sandpaper (#400) or replace the armature assy.

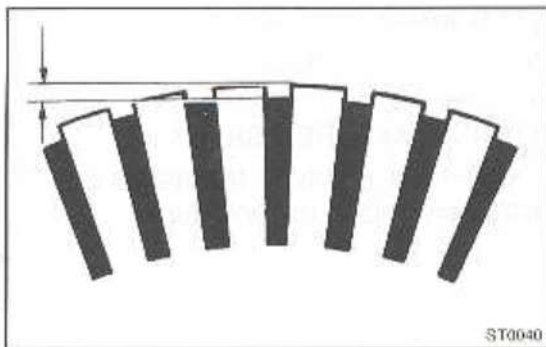


- (d) Using vernier calipers, measure the commutator diameter.

Diameter:

Standard	35.0 mm (1.378 in.)
Minimum	34.0 mm (1.339 in.)

If the diameter is less than the minimum, replace the armature assy.



- (e) Measure the undercut depth of commutator.

Depth:

Standard	0.7 mm (0.028 in.)
Minimum	0.2 mm (0.008 in.)

If the undercut depth is less than the minimum, correct it with a hacksaw blade.

- (f) Inspect the bearings.

- (1) Check that the bearing rotates smoothly.

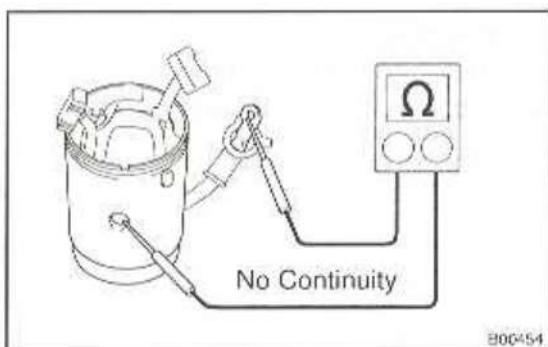
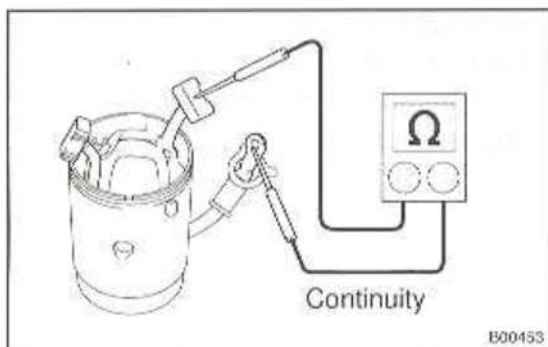
If necessary, replace them.

6. INSPECT STARTER YOKE ASSY

- (a) Inspect for open circuit.

- (1) Check that there is continuity between the terminal C wire and brushes.

If there is no continuity, replace the starter yoke.

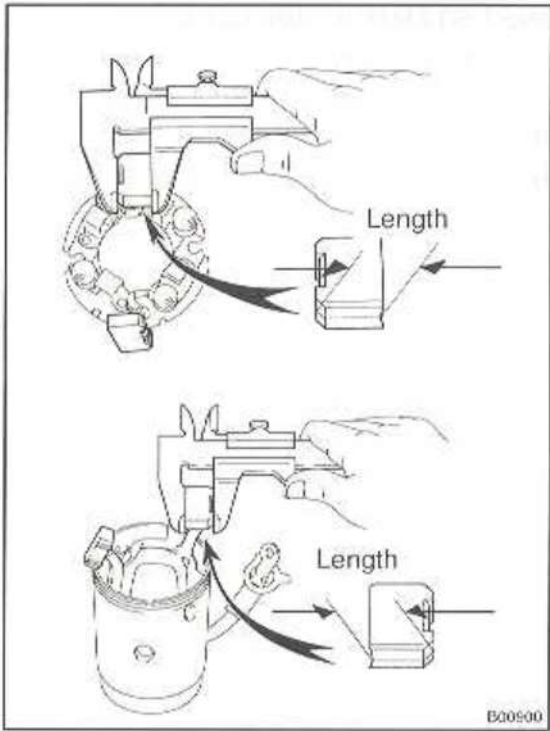


- (b) Inspect for ground.

- (1) Check that there is no continuity between the terminal C wire and starter yoke body.

- (2) Check that there is no continuity between the brushes and starter yoke body.

If there is continuity, replace the starter yoke assy.



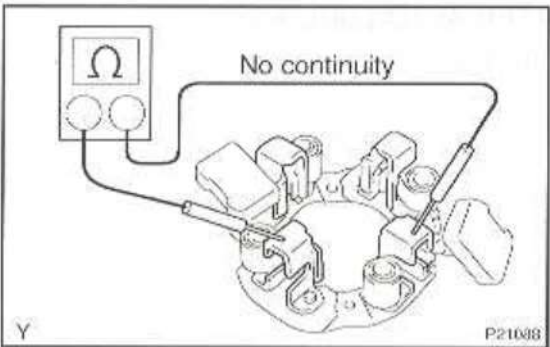
7. INSPECT BRUSH

(a) Using vernier calipers, measure the brush length.

Brush length:

Standard	16.5 mm (0.650 in.)
Minimum	9.0 mm (0.354 in.)

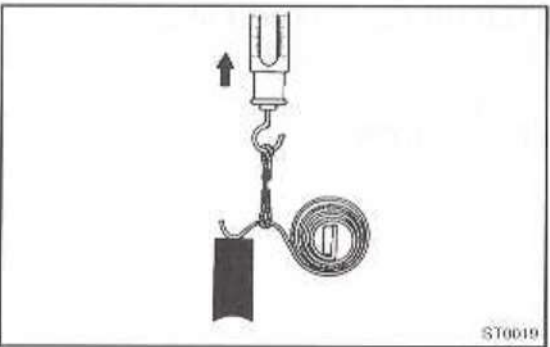
If the length is less than the minimum, replace the brush holder and starter yoke assy.



8. INSPECT STARTER BRUSH HOLDER ASSY

(a) Using an ohmmeter, check that there is no continuity between the positive and negative brush holders.

If there is continuity, replace the brush holder.

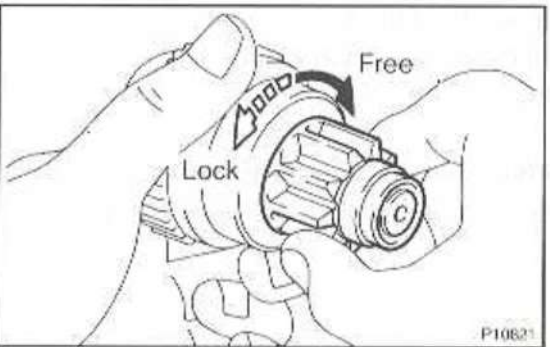


(b) Using a pull scale, measure the brush spring load.

Spring load:

Standard	26.5 – 32.3 N (2.7 – 3.3 kgf, 6.0 – 7.3 lbf)
Minimum	17.6 N (1.8 kgf, 4.0 lbf)

If the spring load is less than the minimum, replace the brush springs.

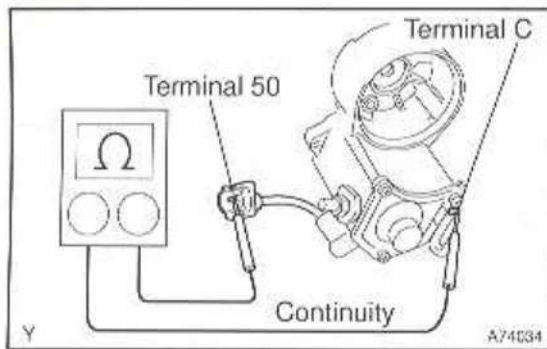


9. INSPECT STARTER CLUTCH SUB-ASSY

(a) Check that the starter clutch operates.

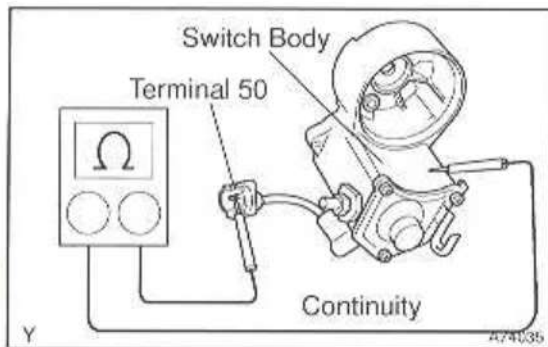
If the starter clutch is does not operate, replace it.

STARTING & CHARGING - STARTER ASSY (5L-E)

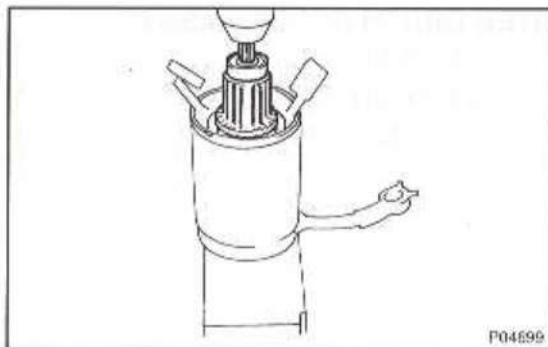


10. INSPECT MAGNET STARTER SWITCH ASSY

- (a) Check the pull-in coil continuity.
(1) Using an ohmmeter, check that there is continuity between terminals 50 and C.
If there is no continuity, replace the magnet starter switch assy.

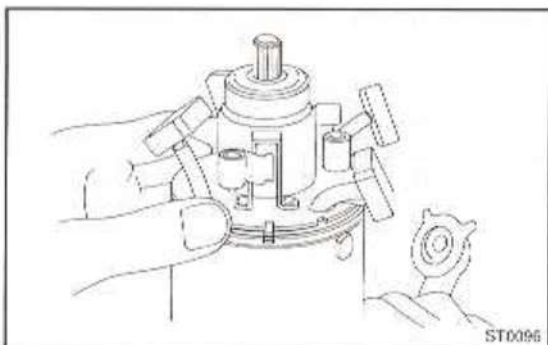


- (b) Check the holding coil continuity.
(1) Using an ohmmeter, check that there is continuity between terminals 50 and switch body.
If there is no continuity, replace the magnet starter switch assy.



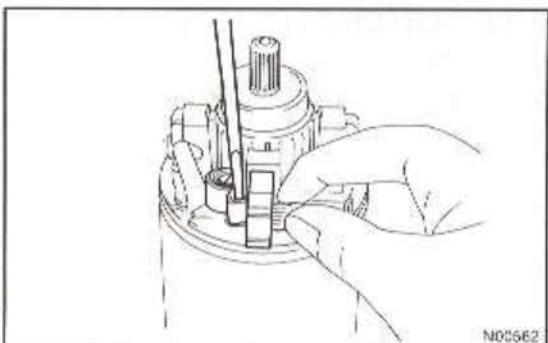
11. INSTALL STARTER ARMATURE ASSY

- (a) Using a press, install the armature assy.



12. INSTALL STARTER BRUSH HOLDER ASSY

- (a) Align the claw of the brush holder with the claw groove of the starter yoke assy.
(b) Place the brush holder on the starter yoke assy.



- (c) Using a screwdriver, hold the brush spring back.
(d) Connect the brush into the brush holder.
(e) Connect the 4 brushes.

NOTICE:

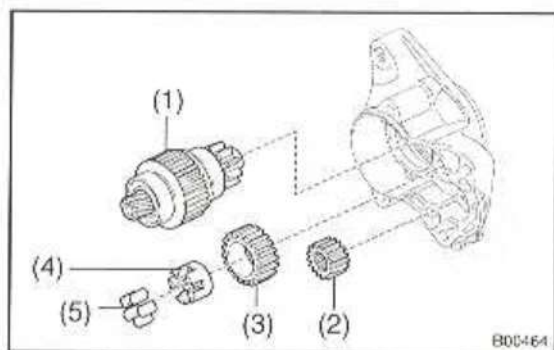
Check that the positive (+) lead wires are not grounded.

- (f) Install a new O-ring to the groove of the starter yoke.

STARTING & CHARGING — STARTER ASSY (5L-E)

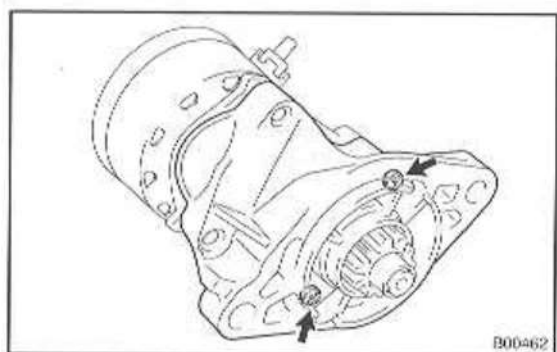
13. INSTALL MAGNET STARTER SWITCH ASSY

- (a) Apply grease to the steel ball, return spring.
- (b) Install the steel ball into the magnet starter switch hole.
- (c) Insert the return spring into the magnet starter switch hole.



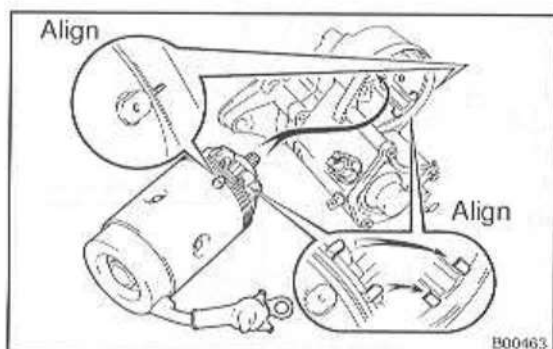
- (d) Place these parts in position on the starter housing.

(1)	Starter clutch sub-assy
(2)	Starter armature pinion
(3)	Starter idler pinion
(4)	Retainer
(5)	Clutch roller

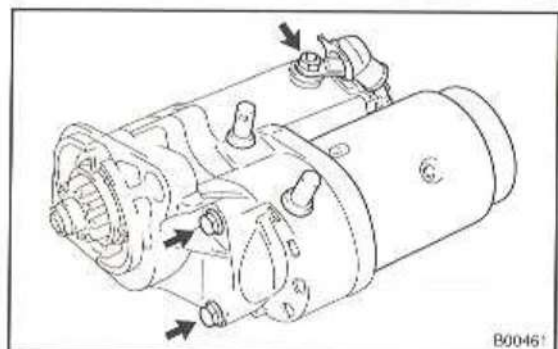


- (e) Install the starter housing to the magnet magnet switch assembly with the 2 screws.

Torque: 9.3 N·m (95 kgf·cm, 82 in.-lbf)

**14. INSTALL STARTER YOKE ASSY**

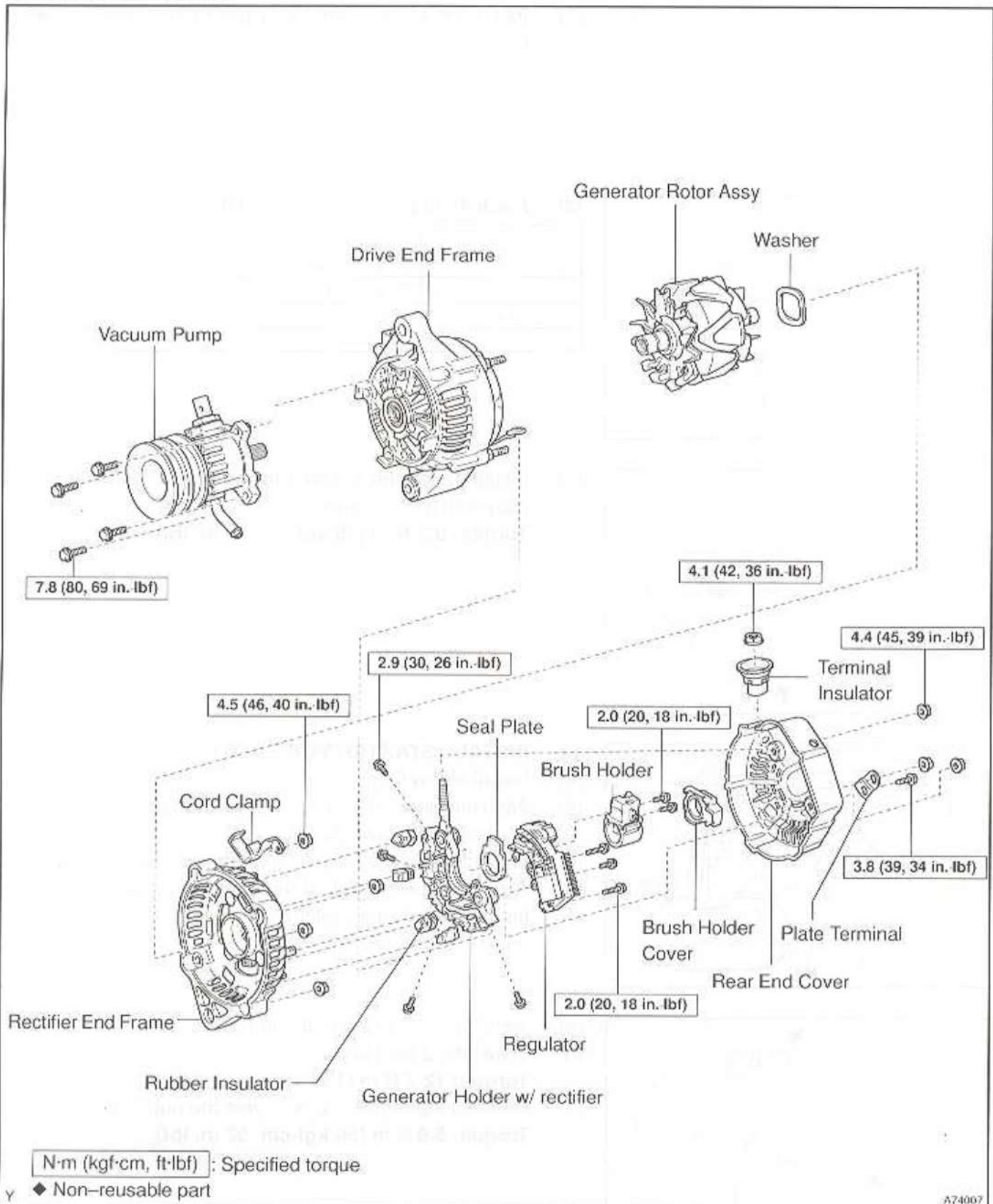
- (a) Install a new O-ring to the groove of the through bolt.
- (b) Align the claws of the brush holder with the grooves of the magnet starter switch.
- (c) Install the starter yoke assy with the armature assy.
- (d) Align the punch mark of the starter yoke with the line of the magnet starter switch.



- (e) Install a new O-ring to the through bolt.
- (f) Install the 2 long bolts.
- Torque: 12.7 N·m (130 kgf·cm, 9 ft-lbf)**
- (g) Connect the terminal C wire with the nut.
- Torque: 5.9 N·m (60 kgf·cm, 52 in.-lbf)**

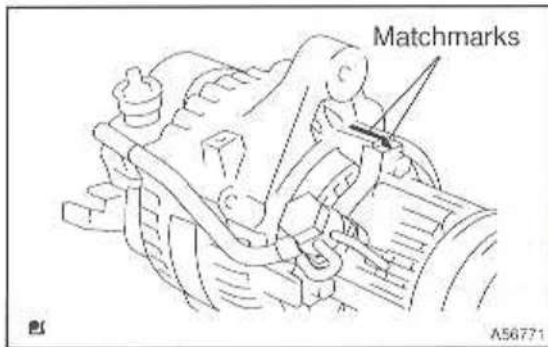
GENERATOR ASSY (5L-E) COMPONENTS

193 W-01

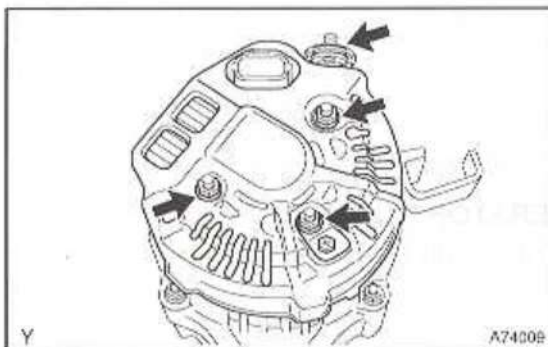


OVERHAUL

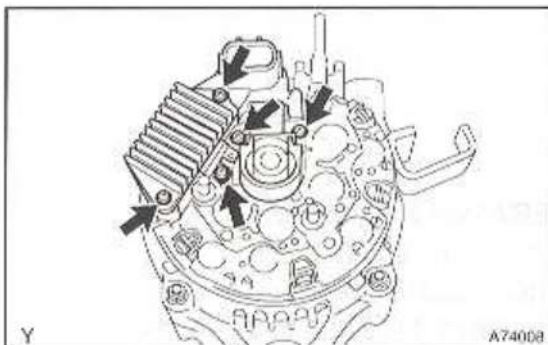
1905K-01

**1. REMOVE VACUUM PUMP ASSY**

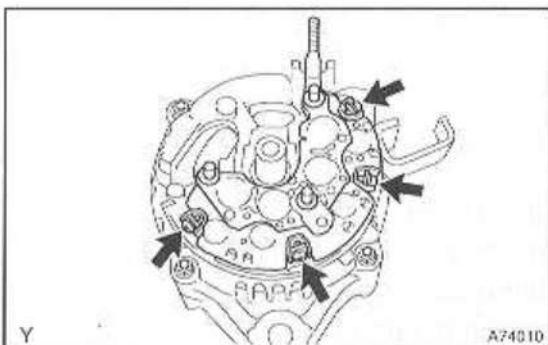
- (a) Place the matchmarks as shown.
- (b) Remove the 4 bolts and vacuum pump assy.

**2. REMOVE REAR END COVER**

- (a) Remove the nut and terminal insulator.
- (b) Remove the bolt, 3 nuts, plate terminal and rear end cover.

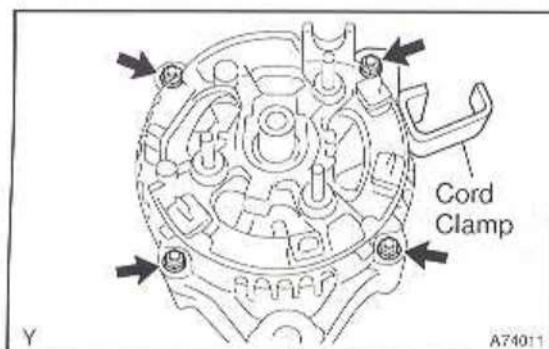
**3. REMOVE GENERATOR BRUSH HOLDER AND GENERATOR REGULATOR**

- (a) Remove the brush holder cover.
- (b) Remove the 2 screws and brush holder assy.
- (c) Remove the seal plate.
- (d) Remove the 3 screws and regulator assy.

**4. REMOVE GENERATOR HOLDER W/RECTIFIER**

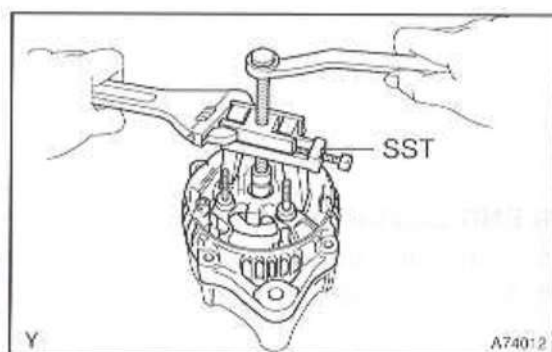
- (a) Remove the 4 screws and rectifier holder.
- (b) Remove the 4 rubber insulators.

STARTING & CHARGING - GENERATOR ASSY (5L-E)



5. REMOVE RECTIFIER END FRAME

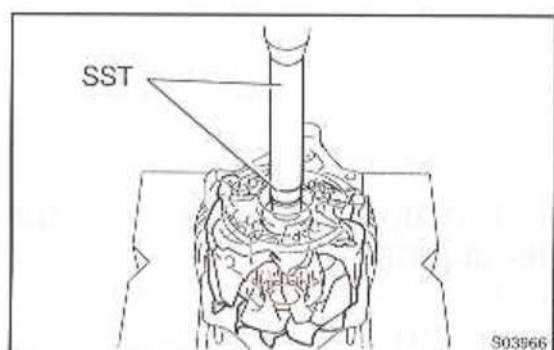
(a) Remove the 4 nuts and cord clamp.



(b) Using SST, remove the rectifier end frame.

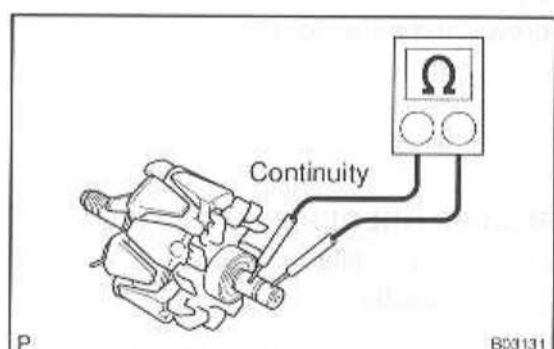
SST 09286-46011

(c) Remove the generator washer from the rotor.



6. REMOVE GENERATOR ROTOR ASSY

(a) Using SST and press, press out the rotor.



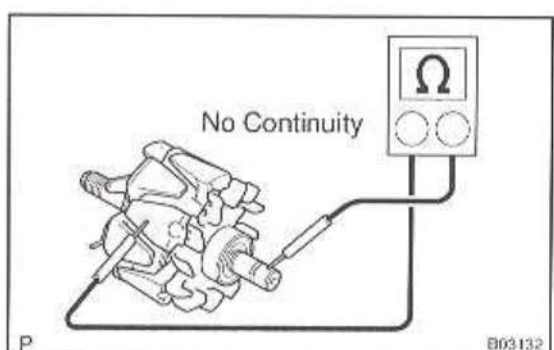
7. INSPECT GENERATOR ROTOR ASSY

(a) Check the rotor for open circuit.

(1) Measure the resistance between the slip rings.

Standard resistance: 2.1 – 2.5 Ω at 20 °C (68 °F)

If there is no continuity, replace the rotor.

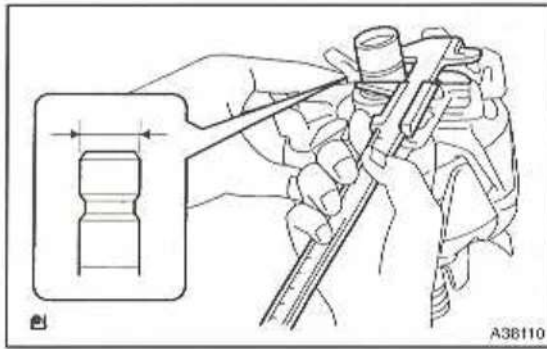


(b) Check the rotor for ground.

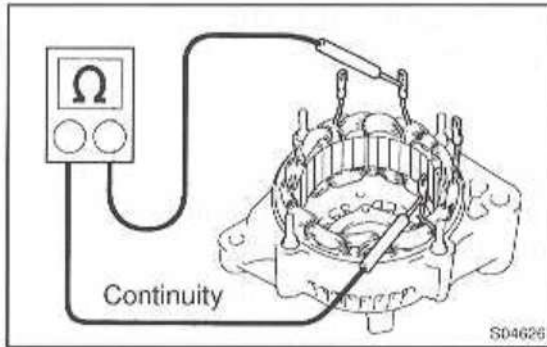
(1) Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.

STARTING & CHARGING - GENERATOR ASSY (5L-E)

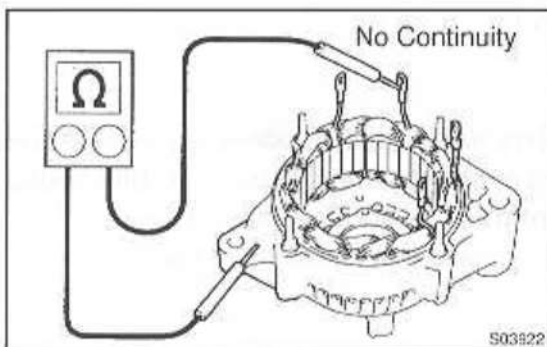


- (c) Check that the slip rings are not rough or scored. If rough or scored, replace the rotor.
- (d) Using vernier calipers, measure the slip ring diameter.
Standard diameter: 14.2 – 14.4 mm (0.559 – 0.567 in.)
Minimum diameter: 12.8 mm (0.504 in.)
 If the diameter is less than the minimum, replace the rotor.
- (e) Inspect the bearing.
 (1) Inspect the bearing is not rough or worn.
 If necessary, replace the generator rotor.

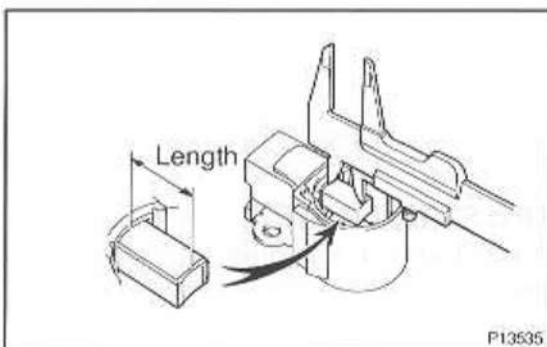


8. INSPECT DRIVE END FRAME

- (a) Check the stator for open circuit.
 (1) Using an ohmmeter, check that there is continuity between the coil leads.
 If there is no continuity, replace the drive end frame assembly.

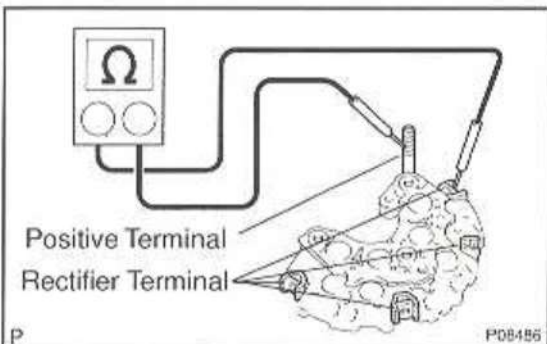


- (b) Check the stator for ground.
 (1) Using an ohmmeter, check that there is no continuity between the coil lead and drive end frame.
 If there is continuity, replace the drive end frame assembly.
- (c) Inspect the bearing.
 (1) Inspect the bearing is not rough or worn.
 If necessary, replace the generator assy.



9. INSPECT GENERATOR BRUSH HOLDER ASSY

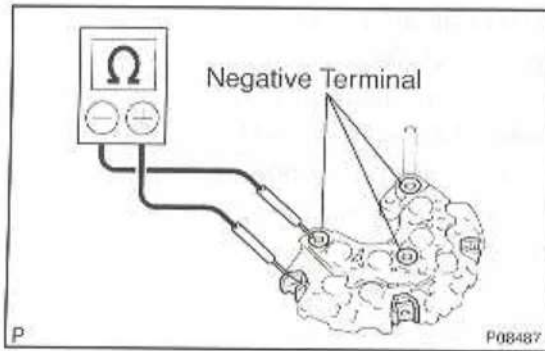
- (a) Using vernier calipers, measure the exposed brush length.
Standard exposed length: 9.5 – 11.5 mm (0.374 – 0.453 in.)
Minimum exposed length: 1.5 mm (0.059 in.)
 If the exposed length is less than the minimum, replace the brush holder assembly.



10. INSPECT GENERATOR HOLDER W/RECTIFIER

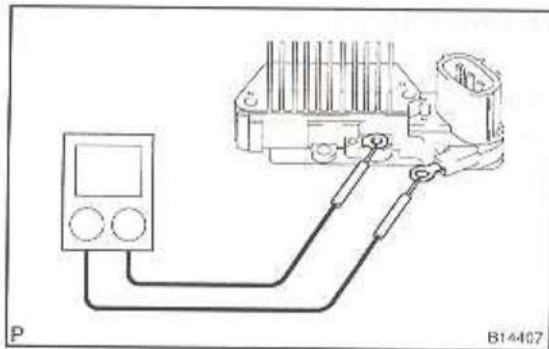
- (a) Check the positive rectifier.
 (1) Using an ohmmeter, connect one tester probe to the positive terminal and the other to each rectifier terminal.
 (2) Reverse the polarity of the tester probes and repeat step (1).
 (3) Check that one shows continuity and the other shows no continuity.
 If the continuity is not as specified, replace the rectifier holder.

STARTING & CHARGING - GENERATOR ASSY (5L-E)



- (b) Check the negative rectifier.
- (1) Using an ohmmeter, connect one tester probe to each negative terminal and the other to each rectifier terminal.
 - (2) Reverse the polarity of the tester probes and repeat step (1).
 - (3) Check that one shows continuity and the other shows no continuity.

If the continuity is not as specified, replace the rectifier holder.



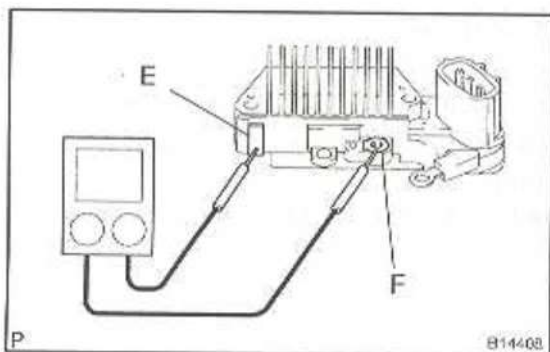
11. INSPECT GENERATOR REGULATOR ASSY

- (a) Using an ohmmeter, check the continuity between terminals F and B.

Standard:

When the positive and negative poles between terminals F and B are exchanged, there is continuity in one way but no continuity in another way.

If the continuity is not as specified, replace the regulator.



- (b) Using an ohmmeter, check the continuity between terminals F and E.

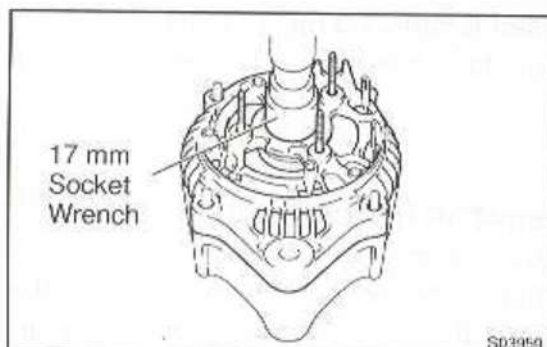
Standard:

When the positive and negative poles between terminals F and E are exchanged, there is continuity in one way but no continuity in another way.

If the continuity is not as specified, replace the regulator.

12. INSTALL GENERATOR ROTOR ASSY

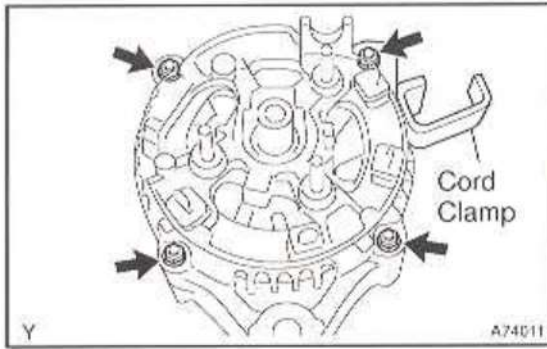
- (a) Using a press, press in the rotor.
- (b) Place the alternator washer to the rotor.



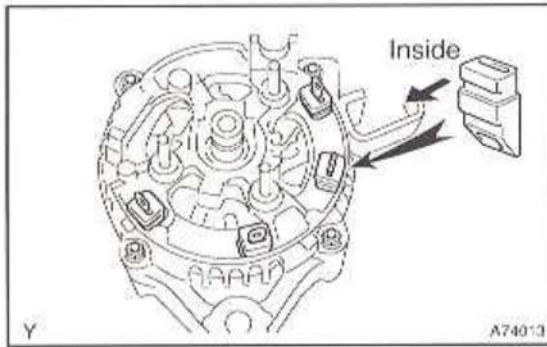
13. INSTALL RECTIFIER END FRAME

- (a) Using a 17 mm socket wrench and press, slowly press in the rectifier end frame.

STARTING & CHARGING — GENERATOR ASSY (5L-E)



- (b) Install the cord clamp and 4 nuts.
Torque: 4.5 N·m (46 kgf·cm, 40 in.-lbf)

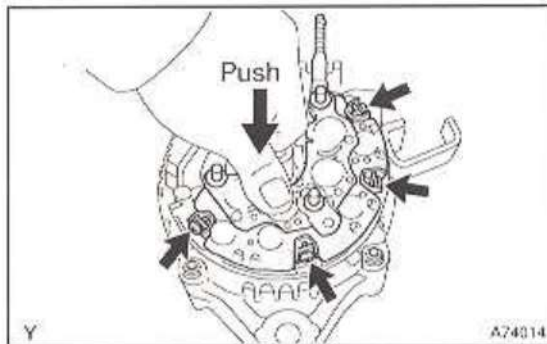


14. INSTALL GENERATOR HOLDER W/RECTIFIER

- (a) Install the 4 rubber insulators on the lead wires.

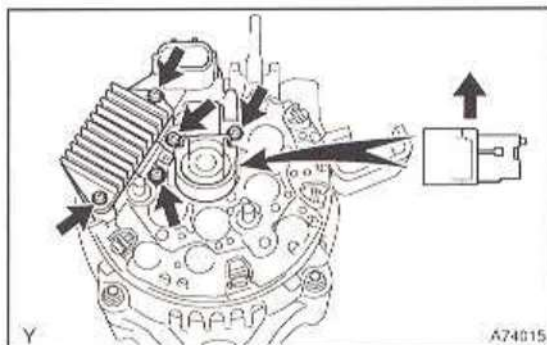
NOTICE:

Be careful of the rubber insulators installation direction.



- (b) Install the rectifier holder while pushing it with the 4 screws.

Torque: 2.9 N·m (30 kgf·cm, 26 in.-lbf)



15. INSTALL GENERATOR BRUSH HOLDER AND GENERATOR REGULATOR

- (a) Install the regulator assy with the 3 screws.

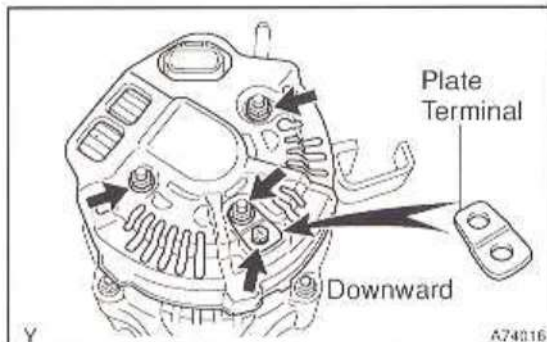
Torque: 2.0 N·m (20 kgf·cm, 18 in.-lbf)

- (b) Place the seal plate.

- (c) Install the brush holder assy with the 2 screws.

- (d) Place the brush holder cover.

Torque: 2.0 N·m (20 kgf·cm, 18 in.-lbf)



16. INSTALL REAR END COVER

- (a) Install the rear end cover and plate terminal with the bolt and 3 nuts.

Torque:

4.4 N·m (45 kgf·cm, 39 in.-lbf) for nut

3.8 N·m (39 kgf·cm, 34 in.-lbf) for bolt

- (b) Install the terminal insulator with the nut.

Torque: 4.1 N·m (42 kgf·cm, 36 in.-lbf)

